

Grade 3

Tree Enemies

Objective

- Students will understand some of the causes of damage to trees and what they can do to help prevent it.

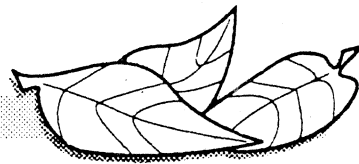
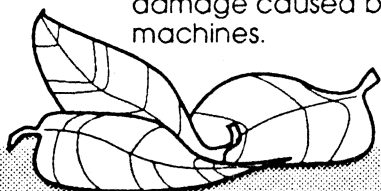
Background Information

Our priceless friends, the trees, have many enemies. Fire, wind, ice, lightning, **pollution**, disease, insects, machines and vehicles, animals, and abuse from people all take their toll. Some of these, such as weather damage, we can't prevent. Others we can do much about. With good care and management, trees can continue to be **renewable natural resources**.

Trees give us many things. This includes fuel, lumber, wood pulp, fiber, and food for both humans and animals in the form of fruits, nuts, bark, and leaves. Trees are an essential part of the earth's environment because they absorb **carbon dioxide**, give off **oxygen**, hold water and soil in place, and return nutrients to the soil.

Forests are delicate. If disturbed, they can be destroyed. It is our job to protect, **conserve**, and manage the forests of the world rather than simply cut them for our uses today. Proper management of a lumber forest includes planting, growing, and reproducing trees to provide lumber in the shortest possible time. At the same time, forest managers must control **erosion**, guard **watersheds**, protect animals, allow for agriculture, and provide for recreation. Each of us has a responsibility to do what we can to save and protect trees, too.

In these lessons, we will discuss some of the natural causes of damage to trees, as well as damage caused by people and machines.



Vocabulary Words

pollution	root grafts
renewable natural resources	blockages
carbon dioxide	sapwood
oxygen	chemicals
conserve	environment
erosion	girdling
watersheds	humus
fungus	kindling
elm bark beetles	

Natural Causes of Damage

Did you know that trees, just like people and animals, can get diseases? They can...and it can be serious.

A **fungus** is a tiny plant that may be deadly to certain trees. Two diseases caused by fungus that have had major effects on the trees in the United States are Dutch elm disease and oak wilt.

Dutch Elm Disease

Dutch elm disease was first described in the Netherlands in 1919. It spread quickly in Europe and by 1934 was found in most European countries and the British Isles.

European **elm bark beetles**, which carry the disease, were reported in the United States, in Massachusetts, as early as 1909. The fungus that causes the disease came into this country in logs shipped from Europe. The logs contained both the fungus and the European elm bark beetles. The logs were shipped to factories in New York, Ohio, and Indiana. The bark beetles escaped from the logs as they traveled and carried the fungus to at least seven states.

Once in the country, Dutch elm disease spread rapidly. In 1930, new diseased elm trees were found in Ohio. The disease was reported around the port of New York in 1933. Dutch elm

disease is now found in 41 states, from southeastern Canada to Texas, west to Colorado and California, and north to Oregon. It is the most destructive shade tree disease in North America.

The first cases of Dutch elm disease in Utah were reported in the early 1980's. It's believed that it came in from Idaho where it had been previously reported.

The American elm has been planted in cities and towns throughout Utah. Spread of the disease through the state has been spotty. Siberian elm is more plentiful but it is resistant to the disease.

Hopefully, through careful monitoring, the disease can be kept under control in Utah.

How is the disease spread?

Dutch elm disease is caused by a fungus. It spreads from tree to tree in two ways: First, elm bark beetles carry the fungus spores attached to their bodies and pass them into healthy trees when they feed on their branches. Second, the disease can be spread by **root grafts** (roots naturally growing together) when the roots of an infected tree happen to be grafted to the roots of a healthy tree.

Once in the tree, the Dutch elm disease fungus invades the water-conducting vessels of the elm. The fungus causes the tree to form **blockages**, in an attempt to stop the invader. Together with the fungus, these blockages plug the water-carrying vessels of the tree and stop water movement. This causes the tree to wilt and die.

What are the signs of the disease?

The first sign of Dutch elm disease in a tree is wilting in one or more of the upper branches. Leaves on the branches turn dull green to yellow and curl, then become dry, brittle, and turn brown. Peeling bark from wilted branches of diseased trees shows light to dark brown streaks or solid blue to gray colored streaking of the wood beneath the bark. In a cross section of the branch, you'll see a broken brown ring in the outer **sapwood** of the wilting, dead, or dying branches.

Some trees die several weeks after becoming infected, while others wilt slowly and survive for a year or longer.

How can we prevent the disease from spreading?

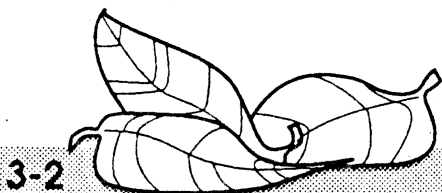
The best way to manage Dutch elm disease is to prevent it. The ways to prevent Dutch elm disease are described as "sanitation." This includes catching signs of the disease early, and getting rid of all weakened, dying, or dead elm trees. Stripping the bark from elm wood takes away elm bark beetle breeding places and sources of the fungus. The steps in a sanitation program are:

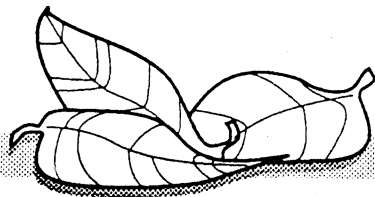
1. *Catch the disease early.* Foresters carefully inspect elm trees in any area where the disease has been found. This inspection turns up trees showing signs of disease.

2. *Separate the tree from others.* Foresters disrupt root grafts between infected and healthy trees. Once a tree is known to be diseased, root graft barriers are set up so the diseased tree's roots cannot spread the disease to healthy trees through root grafts. This root graft blocking can be done by trenching around infected trees, or by putting **chemicals** in holes around the trees.

3. *Remove the diseased wood.* This means getting rid of all dead and dying elm material from the area of diseased trees. Dead and dying elm wood, including stacks of firewood logs, are breeding places for elm bark beetles. A piece of elm branch the size of a small fireplace log can produce up to 1,800 beetles. Left to stand, a complete tree can produce hundreds of thousands of beetles. If this tree is infested with the fungus, each beetle carrying the fungus spores can then carry the disease to healthy trees during feeding. This is why removal of diseased trees is so important.

4. *Destroy diseased wood.* This is done by chipping, debarking, burning, or burying elm material.





Oak Wilt Disease

How is the disease spread?

Oak wilt disease is similar to Dutch elm disease in several ways. First, oak wilt is also caused by a fungus that gets into the tree's outer sapwood. It mainly affects those vessels that carry water and minerals from the roots to the leaves. To try to protect itself from the fungus, the tree forms blockages. They clog the vessels and cut off the tree's water supply. Without water, the oak wilts and dies.

Again as in Dutch elm disease, the fungus that causes oak wilt is carried from tree to tree in two ways. First, it is spread through grafted roots when the roots of a diseased tree are attached to the roots of a healthy tree. Second, the fungus can be spread by sap-feeding beetles. The fungus creates a fruiting or spore-bearing material between the bark and wood of a tree that cracks the bark open. That exposes the spore-bearing material that attracts the beetles. As the beetles crawl on the material, spores of the fungus stick to them. They then fly to other oaks that have been wounded and have exposed water conducting tissues, and infect the healthy trees.

What are the signs of the disease?

As in Dutch elm disease, the first sign of oak wilt disease in a tree is wilting. It usually starts near the top of the tree and then quickly involves the entire crown. You'll also see brown to black coloring in the outer sapwood of the diseased tree.

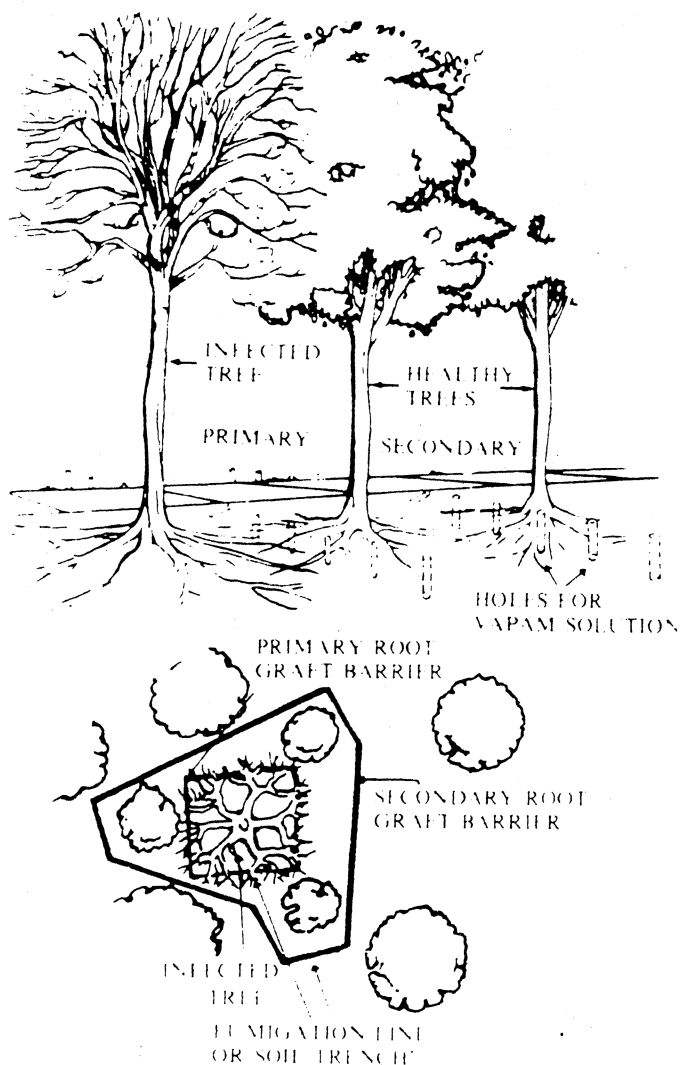
Another sign of oak wilt is leaf color changes. The leaves of red oaks turn dull green, bronze, or tan beginning at the outer edges of the leaf.

Unlike Dutch elm disease, oak wilt can be controlled without destroying every diseased tree. This is because the fungus only produces spores for a short time on a small part of the diseased tree. If these trees are treated so no spores will form on them, infected oak trees can be used for firewood and other purposes. Red oaks can be used only when they are beyond the stage of producing or harboring spores, however. If a red oak is not past this stage, it can be used as firewood only if the bark is removed.

How can we prevent the disease from spreading?

Some of the steps to prevent oak wilt disease

from spreading are similar to those of Dutch elm disease. First, the disease must be found, and diseased trees isolated from healthy trees through separating the root grafts. As with Dutch elm disease, root graft separation is done by mechanically trenching around infected trees or by using Vapam, a soil sterilizing chemical that kills living plant tissue.



A second way to prevent oak wilt from spreading is to protect oak trees from being wounded, especially between April 15 and July 1 each year. Trees should not be pruned during this time and working around trees should be avoided if at all possible.

Insects

Insects can be good or bad for trees. Some are truly plant enemies. They are hungry little creatures that chew away day and night. If they eat all the buds or young leaves on a tree, or the water conducting tissue under the bark, the tree can die.

It is difficult to know how to control insects. Some people use chemicals that kill the bugs, but these chemicals can also cause other damage to the **environment**. Other folks try to combat some bugs with other bugs that like to eat them. This is more difficult, but better for the environment. Getting rid of harmful insect enemies is important, but it has to be done with care. All insects, even those that attack plants, help the balance of nature. The best protection for trees is to keep them healthy in the first place.

Fire

Fire can be another great enemy to trees. When it is very dry, forests can burn quickly. Raging forest fires destroy valuable timber and threaten lives and property. They can also harm the soil and destroy the forest as a home for wildlife. Firefighters battle fires by digging up the ground to create fire breaks and with water to keep them from spreading. Some fires are caused by lightning, but most are caused by careless people.

Fire has a good side as well; it is part of the cycle of life in most ecosystems. Fires can be helpful to trees. They reduce dead wood and help regenerate a forest.

Pollution

Imagine a world that is plain, even ugly—a world without beauty. Imagine a world in which most of the trees are dead. It wouldn't be a very pleasant place to live. But many scientists fear that's what our world will be like if we don't do something about pollution. Both air and water pollution are tough on trees. Pollution can poison a tree's system, slow its growth, and even kill it. Pollution happens when human-made and natural wastes dirty the air or water. Human-made wastes are the main sources of pollution. The greatest air pollution comes from the burning of fuel to power motor vehicles, heat or cool

buildings, and run industry. Water pollution is most heavily caused by wastes from industry, chemicals and other poisonous substances, and household garbage.

Other Human Actions

People can be a tree's best friend; they often are its worst enemy, too. Plants and trees need land to grow on. But people need roads, houses, factories, mines, fields, shopping centers, and parking lots. So trees are chopped down, and land is cleared and paved. Little by little, the world's great forests are disappearing.

Left alone, nature often renews itself. If we change too much land without renewing what we're taking away from it, we can upset or change the environment. Then all plant, animal, and even human life is affected.

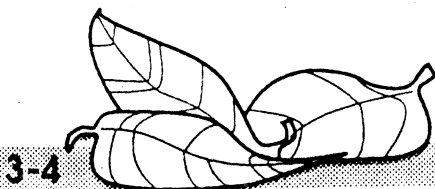
What can people do? Careful and thoughtful management of our resources is the key. People in government, industry, private groups, and individuals are working together to find ways to meet human needs today and also save our resources for future generations.

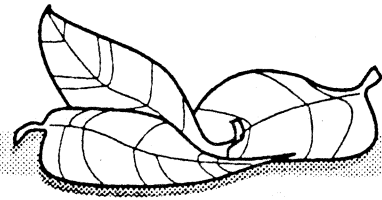
Sometimes we might think people who are cutting down forests and clearing land are the only culprits. Not true. People are wounding trees every day right in our own neighborhoods!

Trees are wounded in three ways—damage to roots, to bark, and to the structure itself (limbs, trunk, leaves). Serious damage to any of these parts of the tree can threaten its health or even kill it. Many tree wounds are caused simply because people do not realize their actions could be hurting trees. Trees seem so strong, so sturdy...sometimes we don't think about how vulnerable they are.

What are some ways each of the three sections of the tree can be injured by people? What effects do these injuries have on trees?

a. **Tree roots** are injured when they're cut into or cut off, choked off from needed moisture or nutrients, or poisoned. Lawnmowers, digging or grading equipment, and even shovels can create serious root-cutting problems. Packing the soil above the roots limits air and moisture flow and can damage delicate roots. Dumping





chemicals and other toxic substances near the root system of a tree can cause poisons to enter the conducting vessels of the tree, damaging and killing tissue. Since the root of the tree is the first step in its food system, damage to roots can close down the tree's ability to get water and nutrients. Without these essentials, the tree will die.

b. **Damage to bark** happens through cutting or carving, ramming, fire, animal activity, people chaining or attaching things to the tree. Lawn mowers and weed eaters do their share, too. Bark has an outer dead layer and an inner living layer. The outer layer is the "skin" of the tree, protecting the soft inner parts of the tree from damage. The inner layer of bark carries food made by the leaves to other parts of the tree. Bark is a fascinating material that stretches and separates as the tree gets larger. The grooves are created when the bark cracks and dries as it's forced to stretch to fit the growing tree. Bark damage makes the tree more open to disease, rot, animal and insect invasion. It also destroys some of the water conducting tissues.

If bark injuries aren't too serious, uninjured parts of the tree can carry food and water supplies. Bark damage that goes most of the way or all around the tree is called **girdling**. Girdling usually kills the tree. Tree guards or mesh shields can help protect against girdling damage from animals and careless humans.

c. **Damage to the structure of the tree** comes through cutting, carving, breaking off, improper pruning, climbing, etc. This type of damage ruins the beauty of the tree. If there are bark injuries or open cuts, the tree faces the same health threats it did in b, above.

What can we do to help protect trees? A lot! Here are just a few suggestions:

- **Recycle newspapers and wastepaper.** Boy Scouts, Girl Scouts, and other groups often collect old paper. Many cities also recycle it. It can be sent to places that make new paper from it. This means fewer trees will be cut down to be made into paper.

- If you have a lawn, help your family rake the leaves that fall on it in autumn. Don't burn them - that pollutes the air. Instead, rake them into an out-of-the-way pile. Flatten the top of the pile

and leave it where rain can soak into the pile. The leaves will rot and turn into dark, muddy-looking **humus** (soil). Spread the humus on your lawn and it will make the soil richer for the grass and other plants.

- Don't peel the bark from trees. The outside bark protects a tree from insects and fungi. The inner bark moves food from the leaves to the roots. Peeling off a tree's bark is like taking off its skin. It may cause the tree to die.

American Elm's Twilight

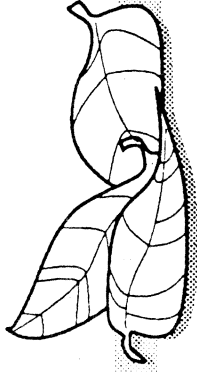
An old friend died today. You won't find his name in the obituary column even though he has been a resident of Fargo longer than most. He was one of the first to welcome me to Fargo. Knowing what a grand creature of nature he was, I imagine he welcomed many people. Once you got to know him he would share many secrets with you. All you had to do is sit with him. He told me about the river, the blowing winds of the plains; he even talked about the city when it was young. The last few years you could see his disease spreading. However in my own mind, I refused to believe he would die.

He was such a strong creature. I remember once when he held me and a canoe in his arms. It was during the flood of 1975. It was during this time he really shared a lot of secrets with me. He shares the secrets of the river, wood ducks, squirrels, and those pesky raccoons. He lived next to the river and I moved into this neighborhood because I enjoyed him so much. When a close friend of his died I learned a lot about age.

When anything dies we think of all the good they have done. He will be missed by many friends: squirrels, birds, and even raccoons that gave him so much grief. There is no one to take his place and there won't be for the next 50 or 60 years.

I went down to see him early this morning. To see him laid out seemed so unnatural. As I looked around, it made me so sad that there was not one to take his place and so few to grieve him. He was born in about 1805 and died 1985 of Dutch Elm disease.

Letter to Editor
Fargo Forum, 10-09-85
Jim Papacek, Fargo
N.D. Outdoors, July, 1986

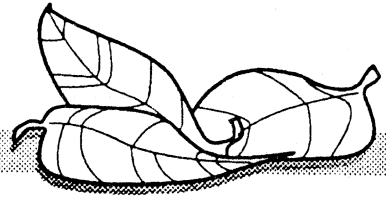


See activity details on
pages 3-8 through 3-13.

Calendar





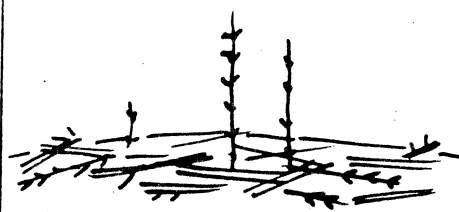
<p>1</p> <p>Interview: Visit city hall to learn about your community's trees.</p> <p>Social Studies</p>	<p>2</p> <p>Research: Learn about Dutch elm and oak wilt diseases.</p> <p>Social Studies/Science</p>	<p>3</p> <p>Hike: Is there a doctor in the forest? Take a nature hike and check it out.</p> <p>Science</p>	<p>4</p> <p>Create: See trees through "the eyes of the beholder."</p> <p>Art</p>	<p>5</p> <p>Discover: Which forest products do you think are most important?</p> <p>Science</p>
<p>6</p> <p>Discuss: Are forest products necessary or just nice? Talk it over!</p> <p>Language Arts/Science</p>	<p>7</p> <p>Interview: Get to know conservation groups.</p> <p>Social Studies</p>	<p>8</p> <p>Record: Go on a wood-finding tour.</p> <p>Science/Math</p>	<p>9</p> <p>Research: Look for: Lilac bushes and apple trees blooming.</p> <p>Science</p>	<p>10</p> <p>Research: What's happening to your community's trees? Newspapers and guest speakers can help you check it out.</p> <p>Social Studies/Science</p>
<p>11</p> <p>Look for: Bees pollinating.</p> <p>Science</p>	<p>12</p> <p>Research: Discover what fast food containers have to do with trees.</p> <p>Social Studies</p>	<p>13</p> <p>Do: How do people wound trees? (Activity Sheet)</p> <p>Social Studies/Science</p>	<p>14</p> <p>Hike: Be damage detectives! Take a nature hike to gather information.</p> <p>Science</p>	<p>15</p> <p>Do: Trees Have Many Enemies. (Activity Sheet)</p> <p>Language Arts/Science</p>
<p>16</p> <p>Discover: How much paper does your school use?</p> <p>Math</p>	<p>17</p> <p>Research: Explore forest fires.</p> <p>Science/Language Arts</p>	<p>18</p> <p>Research: Meet Utah foresters: Dr. Ted W Daniel researcher; Vern Fridley, teacher; and Paul Rokich, planter</p> <p>History</p>	<p>19</p> <p>Listen: Enjoy Shel Silverstein's delightful book, "The Giving Tree."</p> <p>Language Arts</p>	<p>20</p> <p>Look for: Tulips blooming, sugar maple and red oak leaves.</p> <p>Science</p>

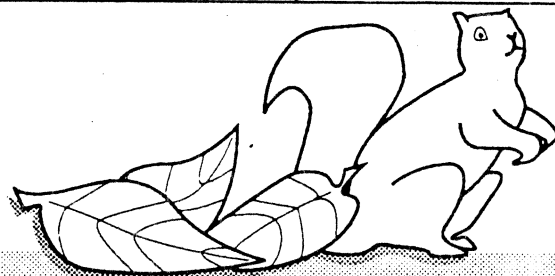
Bulletin Board Idea



Tree Enemies

Create a cause and effect chart that includes both natural and human hazards for trees. Students participate by finding or drawing pictures to match each category. If appropriate in some categories, students might also draw or find pictures that offer solutions to the problems.

Cause	Effect	Solution
Insects 		
Fungi		
Humans 		
Pollution		
Fire		



Activities

Hands on - Minds on Activities

Follow these activities in order and you have one for each of the 20 days in Arbor Month (see calendar). Or, pick and choose any of the activities that best meet your class's needs.

To complete the calendar activities during the month, collect or ask youngsters to bring in the following: mail-order catalogs (Activity 8); newspaper articles about things that are affecting local trees (Activity 10); National Geographic magazine, February 1989 (Activity 17); "The Giving Tree" by Shel Silverstein (Activity 19).

Activity 1: Take a field trip.

Arrange to have your class visit your community's local government offices (city hall, county courthouse) to learn answers to these questions:

1. What department is in charge of the trees in the community?
2. How much money does this department spend each year on tree care?
3. Has the community planted any trees? Where did they get their planting stock (trees)? What species of trees were planted? Why were these species selected? Have the plantings been successful? Did the trees survive?
4. How does the department in charge of trees decide which species will be planted in the community?
5. Who decides where and when trees will be planted? Does the department listen to suggestions from local citizens on when and where to plant? Can local citizens plant trees on the community's property? If they can, how do they go about doing so?

Have students identify a location in their community where they think a tree or trees should be planted. Based on the information they have learned, attempt to get the tree or trees planted.

Note: Instead of visiting the local government office, it may be easier to ask a representative of the department in charge of the community's trees to visit your class to be questioned by students. Questions should be prepared in advance, and if possible, given to the representative before his or her visit.

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Activity 2: Trees get "sick" too!

Discuss the Dutch Elm and Oak Wilt sections of the Background Information part of this unit. Then assign students to one or more of these activities.

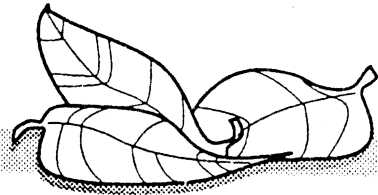
1. Contact your local tree inspector or city forestry department. How serious is Dutch elm or oak wilt disease in your community or neighborhood? How is it being managed? What is being done with trees that are cut down and removed?
2. Is there an area in the community where diseased trees are standing? Visit that area and look for symptoms of Dutch elm or oak wilt disease on the trees. If trees have been recently removed from the area, inspect the stumps. What symptoms of the disease do you see?
3. Think of ways in which your community could prevent a problem like Dutch elm disease and oak wilt disease in the future. (For example, a variety of trees could be planted so disease in one particular species would not spread so quickly.)

Activity 3: Is there a doctor in the forest?

Take your students on a walk to find one tree that looks healthy and another that looks unhealthy. Encourage them to look closely at the growing conditions, for signs of insects (eggs on trunk, larva eating leaves, etc.), and for damage caused by people.

Ask students how they know the difference between healthy trees and unhealthy ones. Back in class, ask them to draw pictures of a healthy tree and an unhealthy one.





Discuss: What things make trees unhealthy? Include such things as disease, insects, fire, wind, lightning, pollution, lack of proper moisture, and poor growing conditions. Can students suggest actions people might take to help trees stay healthy? For example, people can protect trees from forest fires and remove diseased trees so that they won't infect others. They can also water and mulch trees regularly.

Activity 4: Another point of view.

After discussion, based on additional research if necessary, ask students to think about how each of these individuals might view a healthy and an unhealthy tree. Ask the students to choose one of the individuals listed, then draw pictures of healthy and unhealthy trees as they think this individual might see it — or might use it.

an artist
an ecologist
a landscape architect
a forester
a bird who lives in the trees
a tree farmer
a tree inspector
a homeowner
a gypsy moth
a logger
a camper

Create a gallery of these drawings, with the students serving as guides for each other, pointing out the differences in the way the various people and animals might view healthy and unhealthy trees.

*Adapted from Project Learning Tree.
From Teachers' Guide for Arbor Day in New Hampshire.*

Activity 5: Which is most important?

Allow 15 minutes for each student to list ways he or she uses paper and other forest products in a year. Students then draw a line through items on their lists they believe are least important to them and circle three items they consider most important.

Next to each of the three top priority items, students write down a product or material that could replace it. For example, instead of using paper to record thoughts, cassette tapes could be substituted.

Discuss the merits of the ideas they suggest.

1. Is the environment affected? If so, how?
2. Does the substitute serve the same purpose as well and as inexpensively?
3. Is the substitute made from a renewable or a non-renewable raw material?
4. Will the substitute require more or less energy to produce than the original forest product?
5. Is the substitute recyclable?

Activity 6: Necessary or just nice?

Brainstorm a list of forest product uses in these areas of home living:

1. Kitchen (cutting board, knife handles...)
2. Interior (furniture, shutters, coat hangers...)
3. Maintenance (broom handle, vacuum cleaner bags...)
4. Food (vanilla, nuts, wild game...)
5. Exterior (fence post, picnic table...)

Divide the class into small groups. Students use the list for discussion to answer these questions:

1. Which of the items listed are necessary for human survival?
2. Which of the items are wasteful? Which show sound conservation practices? Why? Which of the wasteful products are you willing to eliminate or find a substitute for? What would be the environmental effect if everyone avoided the wasteful products?
3. Look at the items you decided were essential. Are there materials available that could be substituted for the forest products used? Do you think the substitute material would serve as well as the forest product?

Activity 7: Get to know conservation groups!

What are some organizations that work for conservation and protecting the environment? (The American Forestry Association, Izaak Walton League, Greenpeace, National Wildlife Federation, Sierra Club, the Wilderness Society, nature conservatories, and state conservation agencies are some.) Contact one of the organizations in your community. Can someone come out to talk to the students about their work? Or, do they

have brochures and educational materials for young people? Some organizations are already geared to youth - Boy and Girl Scouts, 4-H, Camp Fire Girls, FFA, etc.

Activity 8: Go on a wood-finding tour!

Make a class visit to a local department store or use mail-order catalogs in the classroom.

First, the class makes up a survey sheet for recording information. Divide the class into teams of three or four students each and ask each team to name one of its members as "recorder." The recorder writes team observations on its survey sheet.

Assign each team to a particular department in the store or a section of the catalog. Students are to identify and record as many items as they can that use wood or other forest products. More information such as cost and place of origin also may be gathered.

After information has been collected and tabulated, discuss these questions:

1. Count the total number of wood/forest products found.
2. How would your lifestyle change if forest products suddenly became unavailable?
3. How many items listed are basic survival needs? How do you decide which are needs and which are only wants?
4. What is your own favorite forest product? Why?

Activity 9: Look for: Lilac bushes and apple trees blooming.

Fun Fact: Lilacs are grown and loved all over the world. A color has even been named after them!

Activity 10: What's happening to our neighborhood trees?

Find newspaper articles about things in your community that are affecting the community trees. Report your findings and post the clippings on your bulletin board display. Guest speaker: Invite a nursery, landscape, or tree-pruning professional to speak to your group about how to care for and protect trees.

Activity 11: Look for: Bees pollinating.

Activity 12: Check out containers.

Contact a local fast food business and find out what their food trays and containers are made from. Are they recyclable? Write letters and perhaps draw pictures expressing your concern and encouraging them to help save our trees. If they aren't using recyclable containers, suggest that they do so!

Activity 13: How do people wound trees? Activity Sheet A (page 3-12).

Do the activity sheet and learn more.

Activity 14: Damage detective tour.

Take a walk around the neighborhood and look for different forms of damage to trees. Scars, broken branches, misshapen trees are clues. Discuss:

- a. What caused the damage?
- b. Is this an old injury? A new one? How can you tell the differences between old and new injuries?
- c. What causes tree "bleeding"? How does this compare to scabs people get when they cut themselves?
- d. Why are trees pruned and trimmed? Can pruning help a tree? Hurt a tree? How can you learn proper ways to prune a tree?

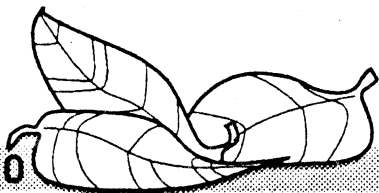
Activity 15: Trees Have Many Enemies. Activity Sheet B (page 3-13).

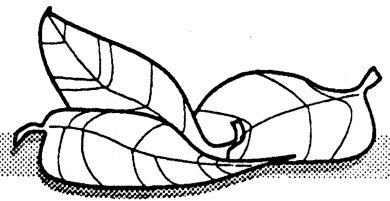
Answers:

o d d y m d p d s z z o l t f g e y
w e e k m i l l g m l h m x v y j z
x w h o f v a x y v h g n w g a i m
x a w n k m i m a u c h r o g z e a
y i x i m a z m h t x y l a s t b
r p n n x x o s e x a f l z a r m l
w o a d a e m i l e y z e j w j h
a e y h a l l i a h x w i s d u a f y
r e t a c c w a y e r t k d t r z
h x o n o x y l l l l g c h n n o i
s h h d w n m o w e r e s c i m
k e e p l i f a t s k i p o t g n n w
v u n n k u r i a g x b i u p s b
r a h i a g t a u o k j f y g b e k
d z v j h a n t y r a c y l h h c m
u h t l k c y k o e v b p w g f i c
s y x d i u a g b a c z l h z s g
s g b e n r t m o j i v l v x e u r

Activity 16: Pounds and pounds of paper!

How much paper do youngsters use in your school? Here's a survey with surprising results:





a. Each student weighs all the paper in his or her desk (books, notebooks, etc.) on a postage scale. Add each student's total for a grand total.

b. Divide to find the average weight of paper per student.

c. Multiply the average weight by number of students in the school. What's the grand total for your school?

d. A 16-inch diameter tree yields 700 pounds of paper. How many trees did your school consume?

Fun Fact: An average of over 600 pounds of paper is used each year by every man, woman, and child in the United States!

Activity 17: Is there such a thing as a good forest fire? Fire is usually an enemy to a forest, but sometimes fire can be helpful. For example, there was a great fire in Yellowstone National Park in the summer of 1988. (For a very informative article about this fire, see National Geographic, Feb. 1989). The summers are very short in this park, so there is little time for dead trees to decay. In 1988, there were great amounts of dry wood lying around like great piles of **kindling**. (Make sure children understand the meaning of this word.) Why would a fire have an easy time taking off during a dry summer? How might this fire have been helpful? (The fire cleaned out old forest and opened space for new growth and meadows. It encouraged growth of different types of vegetation. This in turn brings in animal life. If you can get the National Geographic article, discuss whether or not this fire should have been allowed to burn. What do you think should have been done?)

Activity 18: Nifty naturalists.

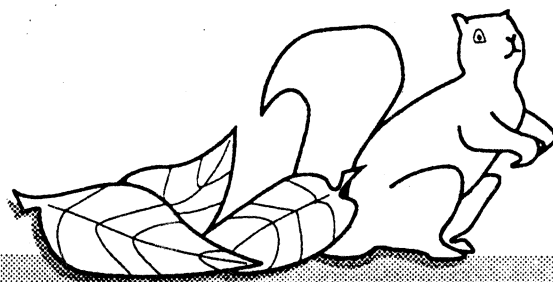
Dr. Ted W. Daniel, Vern Fridley, and Paul Rokich are names of three Utah foresters who have made noteworthy contributions toward the promotion and development of Utah forestry. Each of you can contribute to forestry in Utah. Start a nature journal to write about things you would like to do to help preserve the environment. You're sure to notice things when you take a walk, drive along the roads, or even stare out a window. What new habits or practices can you begin right away? Who can help you put your other ideas into action?

Use your journal to write about natural wonders you'd like to explore in your lifetime. Are they being cared for so future generations can enjoy them?

Activity 19: "The Giving Tree"

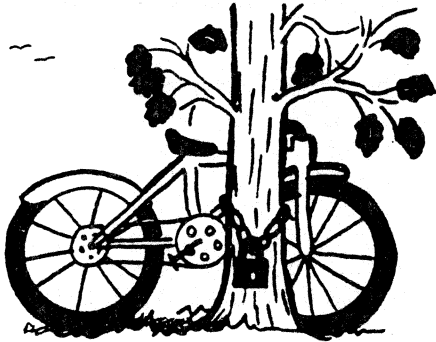
Read and discuss Shel Silverstein's delightful book, "The Giving Tree". What things did people do that were damaging to this tree? How did the tree keep "loving back" in spite of what happened to it? Did any parts of the story make you feel uncomfortable? Why do you suppose many people think this is a sad story?

Activity 20: Look for: Tulips blooming, sugar maple and red oak leaves!



Activity Sheet A

How Do People Wound Trees?



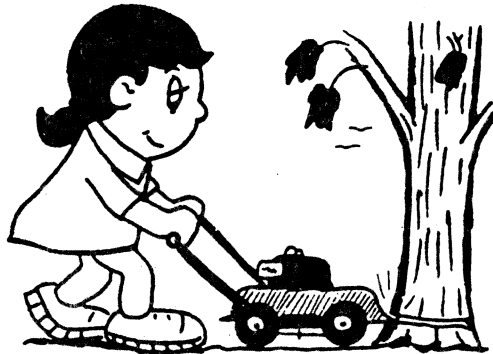
What happens to the tree?



What happens to the tree?



What happens to the tree?



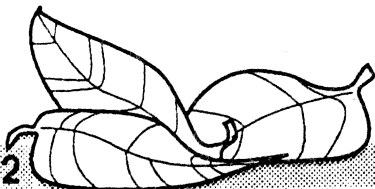
What happens to the tree?



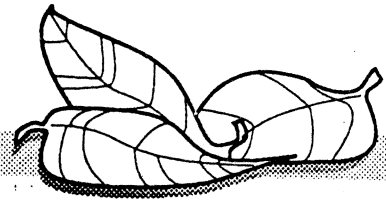
What happens to the tree?



What happens to the tree?



Activity Sheet B



Trees Have Many Enemies



o d d y m d p d s z z o l t f g e y
w e e k m j t l g m l h m x v y j z
x w h g f v a x y v h g n w g q i m
x e w n k m f m a u c h r o g z e q
y l x i i m d z m h t x y l o s t b
r p n n x x p s e x a f l z a r m l
w o a t a d e m f l e y z e j w j h
q e y h g l i a h x w i s d u q f y
r p s g c c w a y e r i f k d t r z
h x o i a k y l l l d v c o h n b i
s b h l a w n m o w e r s e s c i m
f e s p l f q t s k i p o z g n n w
v u n h k u s i q g x b t u s p s b
r q h i n g t n u o k j f y g b e k
d z v j h g n i v r a c y l h h c m
u h t l k c w k o z v b p w g f t c
s y x d i u a g b n a c z l h z s g
s g b e n r t m o j i v l v x e u r

Can you find these words?

lawnmowers	chemicals	pollution	lightning	vehicles	machines	animals
carving	drought	insects	disease	people	wind	fire ice

Answers: See Activity 15, page 3-10.